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THE EFFECT OF SPLINTING TRAINING FOR FRACTURES ON THE KNOWLEDGE AND SKILL LEVELS OF STUDENT COUNCIL MEMBERS

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ABSTRACT

Background: Accidents in Indonesia occur frequently, and one of the injuries resulting from accidents is musculoskeletal injuries, such as fractures. This means everyone must have knowledge and skills. This study aimed to determine the effect of fracture splinting training on the knowledge and skill levels of Student Council members at Kebakkramat Public Junior High School No. 2.
Methods: This study employed a quantitative approach with a one-group pretest-posttest design. The study sample consisted of 30 respondents selected through total sampling. Before the intervention, respondents completed an initial assessment (pretest) using a questionnaire and a skills assessment sheet (tool). Subsequently, respondents received a one-hour training session. Following the training, a post-intervention assessment (posttest) was conducted using the same instruments to determine changes in knowledge and skills before and after the training. Data were analyzed using the Wilcoxon test to determine differences in assessment results before and after the intervention.
Results: The results show that the level of knowledge before training was in the adequate category (76.7%) and improved to the good category (100%) after training. The level of skills before training was in the unskilled category (96.7%) and improved to the skilled category (56.7%) after training. The Wilcoxon test showed a p-value < 0.001 ($\alpha = 0.05$), indicating a significant difference in knowledge and skill levels before and after the training.
Conclusion: Training in splint application effectively improves Student Council members' knowledge and skills in providing first aid for fractures.
Keywords: fracture, knowledge, OSIS, skills, splint bandage

INTRODUCTION

An emergency is a situation that requires swift and appropriate action to prevent disability or death. Delayed treatment can damage vital organs due to a lack of oxygen to body tissues. When a person experiences cardiac arrest and respiratory arrest simultaneously, this is considered clinical death, while brain cell damage can occur within 6–8 minutes after the oxygen supply is cut off (Sahensolar et al., 2021). The school environment is one of the places where accidents and health problems are likely to occur due to the high level of activity students engage in every day (Purnama et al., 2024).

In many countries, bone fractures are one of the most common types of medical emergencies. Data from the World Health Organization (WHO) show a 33.4% increase in the number of bone fracture cases worldwide in 2019 (WHO, 2024). In Indonesia, a 2023 study by the Ministry of Health reported a fracture prevalence of 5.5%. The Bangka Belitung Province had the highest incidence rate at 9.1%, followed by Kalimantan at 8.1%,

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Aceh at 7.9%, and West Kalimantan at 4.0%. In addition, lower-extremity fractures were the most common type, accounting for 67.9% of all cases (Petrus et al., 2025).

Data from the Central Java Central Statistics Agency show that the most common cause of injury was falls, accounting for 60.4%, followed by injuries caused by sharp objects at 16.7% and burns at 1.05%. Injuries occurred at a rate of 13% among those in the 17–20 age group, 21% among those in the 21–25 age group, and 32% among those in the 25–44 age group. (Nawang et al., 2025). Based on a preliminary study conducted at the Kartini Karanganyar Regional General Hospital (RSUD), the number of fracture cases increased during the 2022–2024 period. In 2022, there were 309 cases. This number rose to 428 cases in 2023, and it increased again to 435 cases in 2024 (Kusuma et al., 2025). The data show that bone fractures remain a health issue that requires serious attention.

Fractures are medical emergencies that require immediate treatment because they carry a risk of serious complications if not treated properly (Ridla et al., 2023). Applying a splint to an injured limb is one of the first-aid options. Splinting is an immobilization technique used to stabilize the position of an injured body part, reduce pain, and prevent further tissue damage (Yunus et al., 2023). Conversely, improper immobilization can worsen the victim's condition and increase the risk of complications (Riamah et al., 2024). Therefore, the general public, including school students, needs the knowledge and skills required to apply splints.

Members of the Intra-School Student Organization (OSIS) are students who play an active role in various school activities. Their involvement in activities such as LDKS, sports events, ceremonies, and other school events increases the likelihood of encountering emergency situations, including fractures. Therefore, OSIS members need to be equipped with basic first-aid skills so they can provide appropriate initial assistance before the victim receives medical treatment (Rina et al., 2022).

Students' ability to manage their fractures can be improved through training. Training is a methodical and predetermined learning process designed to improve a person's competence in performing a specific activity (Anisa et al., 2024). One of the best approaches is the demonstration technique, because participants can see firsthand the steps and procedures being taught, making them easier to understand and put into practice (Sinaga et al., 2023). A study conducted by previous study proves that this training successfully increased participants' knowledge (Listiana & Silviani, 2020). The results of another study demonstrate that training in bandaging and splinting effectively improves students' knowledge and skills (Susyanti et al., 2024).

Previous research has shown that splinting training can improve knowledge and skills in managing fractures. However, research on the implementation of splinting training among junior high school students, particularly Student Council members, remains limited. Furthermore, few studies have evaluated simultaneous improvements in knowledge and skills following splinting training in this group. This situation indicates a research gap that warrants further investigation by providing splinting training to junior high school Student Council members.

The novelty of this study lies in its research population, members of the Student Council at Kebakkramat Public Junior High School No. 2, as well as in the simultaneous assessment of two aspects of ability, knowledge, and skills in applying a fracture splint before and after training. Based on the findings of a preliminary study at Kebakkramat Public Junior High School No. 2, conducted through observation and interviews, there are 30 active Student Council members, and the majority have never received training in splinting techniques. This situation indicates that students still require training in first aid for fractures. Therefore, a study is needed to determine how splinting training affects the knowledge and skills of OSIS students in managing fractures. This study sought to assess the impact of

Volume 7 No 2, Hal 56-64, Agustus 2026
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fracture splinting training on the knowledge and skills of Student Council members at Kebakkramat Public Junior High School No. 2.

RESEARCH METHOD

This study employed a quantitative pre-experimental design with a one-group pretest-posttest approach. The study was conducted at Kebakkramat Public Junior High School No. 2 in November 2025. The study population consisted of all student council (OSIS) members at Kebakkramat Public Junior High School No. 2, totaling 30 students. All members of the population were included as research respondents through total sampling.

The inclusion criteria were membership in the student council (OSIS) at Kebakkramat Public Junior High School No. 2 and willingness to participate in the study. The exclusion criteria were respondents who withdrew from the study or did not complete the research and training sessions.

The research instruments consisted of a 20-item knowledge questionnaire and an 18-item observation sheet for fracture immobilization skills. In the knowledge questionnaire, each correct answer was scored 5, while each incorrect answer was scored 0. The scores obtained were then totaled and converted into percentages, with a maximum score of 100%. Knowledge levels were categorized into three categories: good (76–100%), adequate (56–75%), and insufficient (<55%). The assessment of fracture immobilization skills was conducted using an observation sheet comprising 18 items. Each item was scored based on the level of procedural performance: 2 if the procedure was performed perfectly, 1 if it was performed imperfectly, and 0 if it was not performed. The score for each item is then multiplied by its respective weight; all scores are then summed and converted to a percentage by dividing the total score by the maximum possible score and multiplying by 100. Skill levels are categorized as proficient (90–100%), adequately proficient (61–89%), and less proficient (0–60%).

The research instruments used in this study were adapted from previous research. The knowledge questionnaire had undergone validity testing, while the skill assessment sheet had been found to be reliable in previous studies. Therefore, no changes were made to the content or structure of the instruments used. Before the fracture reduction skill observation sheet was used in this study, an inter-rater agreement test involving three observers was first conducted. The level of inter-rater agreement was analyzed using the Intraclass Correlation Coefficient (ICC). The test results showed a single-measure ICC of 0.870 and an average-measure ICC of 0.952, with a p-value < 0.001. These results indicate a very high level of agreement among raters; thus, the fracture splinting skills observation sheet was deemed to have good reliability and is suitable for use as a research instrument.

The intervention in this study consisted of 1 hour of fracture splinting training delivered via demonstration. The training began with the delivery of educational materials covering the definition of fractures, bandaging, the purposes of bandaging, principles of bandaging, bandaging equipment, types of bandaging, the definition of splinting, the purposes of splinting, indications for splinting, and splinting requirements. Subsequently, the researcher demonstrated the fracture-splinting procedure in accordance with the predetermined procedural steps. Following the demonstration, the respondents were given the opportunity to perform the splinting procedure directly under the researcher's supervision as the instructor, using a splint and a triangular bandage (mitela). The respondents performed the splinting procedure according to the previously demonstrated steps. After completion of the entire training session, the respondent’s knowledge and skills were reassessed (posttest) on the same day. The collected data were subsequently analyzed

Volume 7 No 2, Hal 56-64, Agustus 2026
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using the Wilcoxon test to determine differences in respondents' knowledge and skills before and after the fracture splinting training intervention.

This study obtained ethical clearance from the Health Research Ethics Committee of Dr. Moewardi Regional General Hospital, Surakarta, under approval number 2.297/XI/HREC/2025. Before the study was conducted, the researcher explained the study objectives, procedures, potential benefits, and participants' rights to the students and their parents or legal guardians. As the participants were minors aged 10–16 years, informed consent was obtained from their parents or legal guardians, and informed assent was obtained from the students before participation. Participation was voluntary, and participants were informed that they could decline or withdraw from the study at any time without any consequences. The confidentiality of participants' identities and data was maintained throughout the study.

RESULTS

The population in this study consisted of members of the Student Council at Kebakkramat Public Junior High School No. 2. The characteristics of the respondents are presented in Table 1, including age and gender, to describe the demographic profile of the Student Council members participating in the fracture splinting training.

Table 1. Distribution of Respondent Characteristics (n=30)

Respondent characteristics	Frequency (n)	Percentage (%)
Age		
10-13 years old	18	60
14-16 years old	12	40
Total	30	100
Gender		
Man	4	13.3
Women	26	86.7
Total	30	100

According to the data, a total of 30 people participated in this study, including 26 women (86.7% of the total) and 4 men (13.3%). The distribution of respondents' knowledge levels before and after the fracture splinting training is presented in Table 2. The table describes changes in knowledge based on the categories of good, adequate, and inadequate.

Table 2. Data Distribution Knowledge Levels Before and After Training (n=30)

	Level of Knowladge	Frequency (n)	Percentage (%)
Pre Test	Good	0	0
	Adequate	23	76.7
	Inadequate	7	23.3
	Total	30	100
Post Test	Good	30	100
	Adequate	0	0
	Inadequate	0	0
	Total	30	100

Based on the data above, prior to the intervention, the majority of respondents (23; 76.7%) had a sufficient level of knowledge, while a portion (7; 23.3%) had an insufficient level. After the intervention, all 30 respondents (100%) achieved a good level of knowledge. The distribution of respondents' fracture splinting skill levels before and after

Volume 7 No 2, Hal 56-64, Agustus 2026
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the training is presented in Table 3. The table illustrates changes in practical skills based on the categories of skilled, moderately skilled, and less skilled.

Table 3. Data Distribution Skill Levels Before and After Training (n=30)

	Skill Level	Frequency (n)	Percentage (%)
Pre Test	Skilled	0	0
	Moderately Skilled	1	3.3
	Less Skilled	29	96.7
	Total	30	100
Post Test	Skilled	17	56.7
	Moderately Skilled	13	43.3
	Less Skilled	0	0
	Total	30	100

Based on the data above, prior to the intervention, the majority of respondents (96.7%) had insufficient skills, while 1 respondent (3.3%) was skilled. After the intervention, the number of skilled respondents increased to 17 (56.7%), while 13 (43.3%) fell into the fairly skilled category. The results of the Wilcoxon Signed-Rank test assessing differences in respondents' knowledge and fracture splinting skill levels before and after the training are presented in Table 4. The table includes the median scores, minimum and maximum values, and p-values for both variables.

Table 4. Results of the Wilcoxon Test on the Effect of Splinting Training for Fracture Injuries on Knowledge and Skill Levels

Variable	n	Median (Minimum-maximum)	p Value
Level of Knowledge			
Pretest	30	65 (40-70)	0.000
Posttest	30	85 (80-95)	
Wilcoxon test: 0 subjects showed a decrease in knowledge, 30 subjects showed an increase in knowledge, and 0 subjects showed no change in knowledge			
Variable	**n**	**Median (Minimum-maximum)**	**p value**
Skill level			
Pretest	30	28 (19-63)	0.000
Posttest	30	89 (73-100)	
Wilcoxon test: 0 subjects showed a decline in skill, 30 subjects showed an improvement in skill, and 0 subjects showed no change in skill			

Data were analyzed using the Wilcoxon Signed-Rank test to determine differences in respondents' knowledge and skills before and after the fracture splinting training. The Wilcoxon test was selected based on the one-group pretest-posttest research design and the ordinal scale of the data. The results showed significant differences in knowledge ($Z = -4.795$, $p < 0.001$) and in skills ($Z = -4.785$, $p < 0.001$). In addition to statistical significance, the effect size was calculated to determine the magnitude of change following the intervention. The results showed effect sizes of $r = 0.875$ for knowledge and $r = 0.873$ for skills, both indicating a large effect.

DISCUSSION

Based on the findings of a study conducted among members of the Student Council at Kebakkramat Public Junior High School No. 2, 60% of respondents were aged 10-13, and 40% were aged 14-16. This indicates that the majority of participants fall into the early

Volume 7 No 2, Hal 56-64, Agustus 2026
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https://doi.org/10.34035/kn.v7i2.2143

adolescence category. During this phase, individuals experience rapid cognitive development, allowing them to better understand information, think logically, and absorb learning material. These conditions support the effectiveness of the training provided. These findings are consistent with one study indicating that adolescence is the ideal phase for information processing, as cognitive development is at its peak during this time (Bintang et al., 2024).

When grouped by gender, more women than men participated in this study. However, their levels of knowledge and skills were not influenced by gender. This is because an individual's abilities are more heavily influenced by other factors, such as learning experience, motivation, and training methods. These findings are supported by previous research which reveals that men and women have equal abilities in providing first aid (Zainul et al., 2021) .

Most respondents' knowledge level was "fair" before the training, and none fell into the "good" category. This training had a positive impact on all respondents, who rated their performance as "good" afterward. This proves that training plays a very important role in improving students' knowledge. This improvement resulted from a learning process that involved systematic understanding of the material and the use of interactive methods. These results are consistent with the other research which states that training in splint application can significantly improve knowledge through lectures, discussions, and supportive learning materials (Listiana & Silviani, 2020) .

In addition to increased knowledge, the respondents' skills also changed significantly. Before the training, nearly all respondents fell into the "less skilled" category. However, after the training, the majority of respondents moved up to the "skilled" and "fairly skilled" categories. This indicates that skills are highly dependent on hands-on practice and learning experiences. Providing participants with opportunities for individual practice, accompanied by instructor guidance, was a key factor in this improvement in skills. These findings are consistent with one study which confirms that simulation and role-play methods are effective in improving skills because they involve hands-on practice (Sabila et al., 2025).

Training in splint application significantly improved students' knowledge and skills, as indicated by a p-value of 0.000 ($p < 0.05$) from the Wilcoxon test. The training method used demonstrated proved effective because participants were able to directly observe the correct procedure before practicing it themselves. This helped participants gain a deeper understanding of the material and minimize errors during practice.

The findings of this study are supported by previous research that showed that training in splint application significantly improved their skills (Alaydrus et al., 2025) . In addition, the other study found that video-based education can significantly improve learning outcomes (Dewiyanti et al., 2023). Another study also emphasizes that simulation methods are effective in improving participants' skills because they involve active interaction and hands-on experience (Ariyani et al., 2024). The improvement in participants' knowledge and skills following the demonstration-based splinting training may be explained by the active learning process involved in the intervention. Demonstration allows participants to directly observe the correct splinting sequence and technique, making it easier to understand and remember the procedures. In addition, hands-on practice provides participants with the opportunity to apply the demonstrated techniques using appropriate materials and to receive immediate guidance and correction from the facilitator. This combination of visual observation and direct practice may strengthen the connection between theoretical knowledge and practical skills. Repeated observation and practice can also increase participants' confidence in performing splinting procedures and help them retain the information more effectively. Therefore, the effectiveness of demonstration-based training in this study may be attributed not only to the delivery of information but

Volume 7 No 2, Hal 56-64, Agustus 2026
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also to participants' active involvement in observing, practicing, and receiving feedback during the learning process.

The demonstration-based splinting training was conducted for 60 minutes during a single session. The training included an introduction to fracture first aid, the principles and objectives of splinting, preparation of the materials, and a step-by-step demonstration of the correct splinting procedure. The materials used during the training included splints and triangular bandages (mitela). Following the demonstration, participants were given the opportunity to practice the splinting procedure directly using the provided materials under the facilitator's supervision. During the practice session, the facilitator provided guidance and immediate feedback to correct participants' techniques when necessary. PowerPoint (PPT) presentations containing key information about fracture first aid and splinting procedures were used as supporting learning materials. The post-test assessment was conducted immediately after the training session on the same day to evaluate participants' knowledge and skills following the intervention.

The improvement in students' knowledge and skills following the splinting training can be explained by the active learning process involved in the demonstration-based approach. Through direct observation, students saw the correct splinting sequence and technique, which facilitated their understanding of the procedure. The subsequent hands-on practice allowed students to apply the demonstrated steps directly using splints and triangular bandages (mitela). During practice, facilitator guidance and immediate feedback helped students identify and correct errors, thereby strengthening their understanding and practical skills. The combination of visual observation, direct practice, and feedback may have facilitated the transfer of theoretical knowledge into practical skills. Therefore, the improvement observed in this study may be attributed not only to the information provided during the training but also to students' active involvement throughout the learning process.

CONCLUSION

Fracture splinting training offers a practical way to strengthen the preparedness of Student Council members to respond to emergencies in the school environment. The combination of structured educational materials, demonstrations, and supervised hands-on practice supports the development of both conceptual understanding and procedural competence in fracture first aid. These findings underscore the importance of integrating basic emergency response training into school-based student development programs. However, further research with a control group and follow-up assessments is needed to evaluate the sustainability of learning outcomes and the training's effectiveness in real-world emergencies.

RECOMMENDATIONS

Schools are advised to include fracture first aid and splinting training in their regular Student Council activities, especially for members involved in sports, school events, and safety initiatives. The training should encompass structured demonstrations, supervised practice sessions, and periodic refreshers to ensure skills are maintained. Additionally, schools need to make first-aid supplies like splints, triangular bandages, and first-aid kits readily available, along with clear procedures for handling suspected fractures—covering immobilization and referral to health services. Further research is necessary to evaluate how well students retain these skills over time through follow-up assessments and to study the integration of school-based first-aid training into broader emergency preparedness plans.

Volume 7 No 2, Hal 56-64, Agustus 2026
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Volume 7 No 2, Hal 56-64, Agustus 2026
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